

# **Rochester Intermodal Station Project**

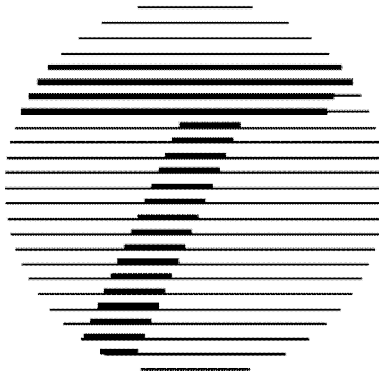
## **PIN 4936.04**

### **Evaluation of the 1914 Pedestrian and Baggage Subway Tunnel under CSX Running Tracks**

Rochester, New York

April 2012

PREPARED FOR:



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Evaluation of the 1914 Pedestrian  
and  
Baggage Subways  
under  
CSX Running Tracks  
  
Rochester, New York

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## TABLE OF CONTENTS

SECTION	PAGE NUMBER
TABLE OF CONTENTS	5
LOCATION MAP	7
I. EXECUTIVE SUMMARY	9
II. SUBWAY TUNNEL DESCRIPTION AND HISTORY	11
III. INSPECTION PROCEDURE AND ACCESS	15
IV. SUMMARY OF INSPECTION FINDINGS	19
V. CONCLUSIONS AND RECOMMENDATIONS	21
APPENDIX A – PHOTOGRAPHS	23
APPENDIX B – HISTORICAL ARTICLE ON NEW YORK CENTRAL STATION AT ROCHESTER, N.Y. - 1914	51

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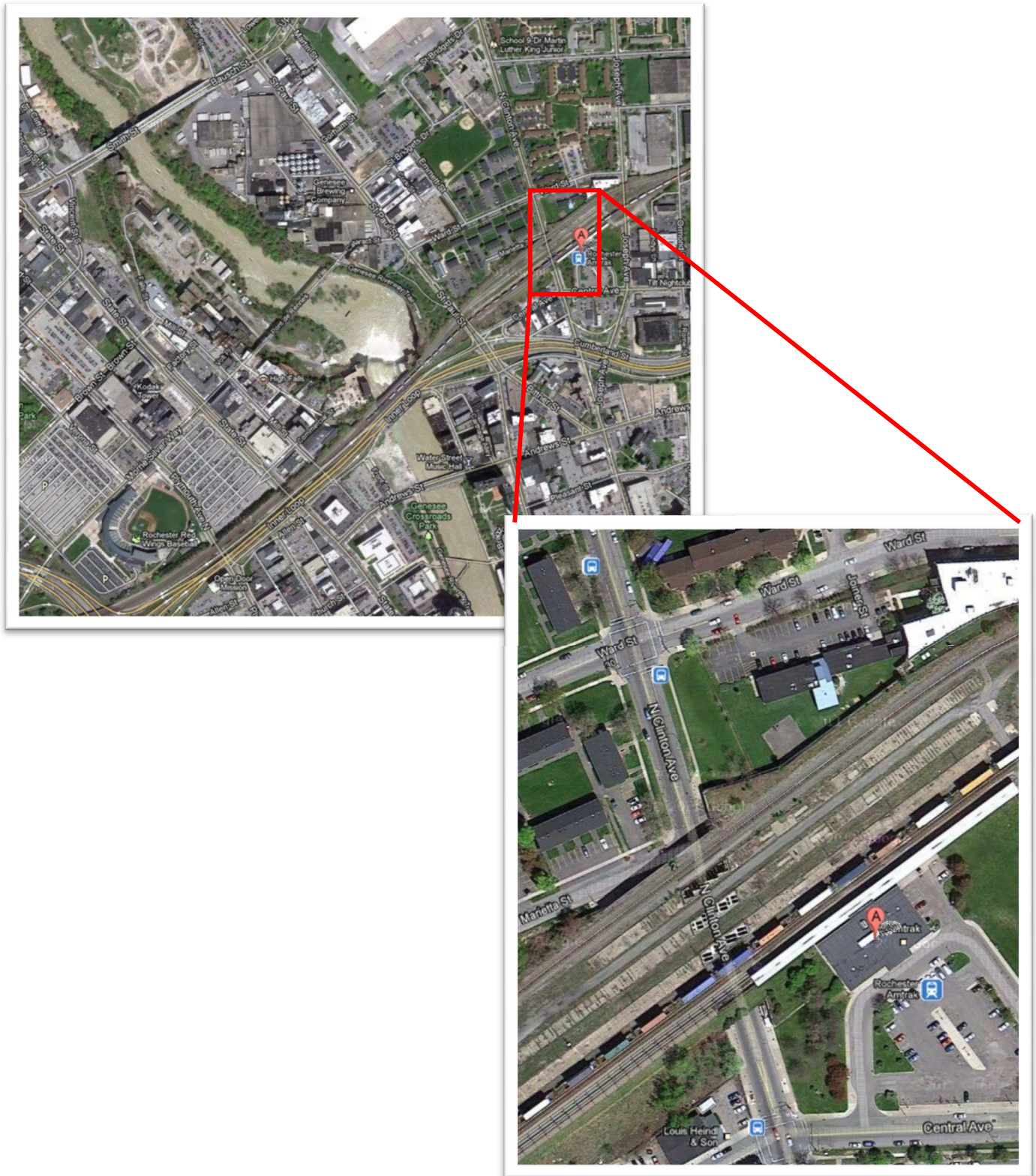


Figure 1 - Subway Tunnel Location Map - Rochester NY

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## **I. EXECUTIVE SUMMARY**

This report outlines the historic configuration, inspection, and current conditions of the baggage and passenger subway constructed in 1914 for the New York Central & Hudson River Rail Road, now owned and operated by CSX Transportation.

The intent of the inspection of the passenger and baggage subway tunnels was to perform a hazardous waste/contaminated material site assessment, perform an asbestos screening and to perform a visual condition inspection of the tunnels to determine their structural integrity. The inspection of the tunnels began on December 13<sup>th</sup> but due to access issues and safety considerations was completed on March 14, 2012. The inspection findings can be found in Section IV. The results of the hazardous waste/contaminated material site assessment are included in a separate report.

In conclusion, reuse of the existing 1914 passenger and baggage subway tunnels for passenger access is not recommended. The current condition, water infiltration issues, required repairs, inadequate geometry, location of the tunnels and long term maintenance issues associated with these structures are primary reasons for this recommendation. Other cost effective solutions for passenger and baggage access between the new station building and the high level platforms should be investigated.

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## II. SUBWAY TUNNEL DESCRIPTION AND HISTORY

This section of the condition survey report contains general information on the Pedestrian and Baggage subways under CSX running tracks as well as structure geometry information collected from original plans and during the condition survey.

Condition findings as well as recommendations for reuse and safety conditions are provided in the following sections of this report. Some of the general information in this section was taken from the February 13, 1914 edition of the Railway Age Gazette. The information from February 13, 1914 edition of the Railway Age Gazette compares favorably to the original drawings supplied by CSX titled: "NYC and HRRR Western Division Proposed Baggage Subway and Proposed Passenger Subway at Rochester" dated May 16, 1911.

The subject pedestrian and baggage subway tunnels were constructed along with a new station for the New York Central & Hudson River Rail Road. The station and tunnels were opened in January 1914. This station served trains on the New York

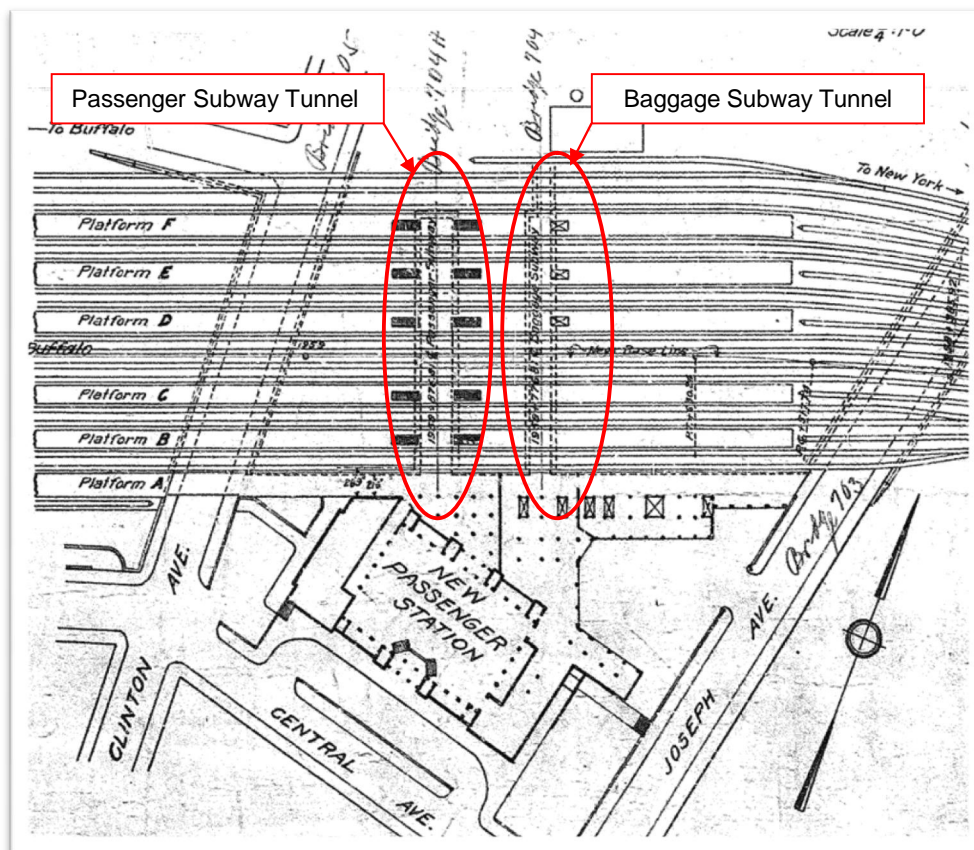


Figure 2 - Passenger and Baggage Subway Tunnel

Central main line and numerous other branch line railroads of the time. In total, 11 station tracks were served by 6 platforms at the station in addition to 4 other tracks.

The station platforms were connected to the main terminal station building by subway tunnels under the tracks. The passenger subway tunnels were approximately 30 ft. wide and 8 ft. high. A row of columns bisect the tunnel down the center. The foundations, walls and floor are reinforced concrete. At five platform locations, stair wells ran perpendicular from the tunnels up to track/platform grade. The roof structure of the pedestrian subway tunnel is comprised of 15"-42#/ft I-beams supported by a central girder over the central columns and concrete backwalls. The roof system is comprised of 7/16" steel plate placed over the I-beams topped with 1" of mortar, a waterproof membrane and 2" thick paving brick laid in asphalt.

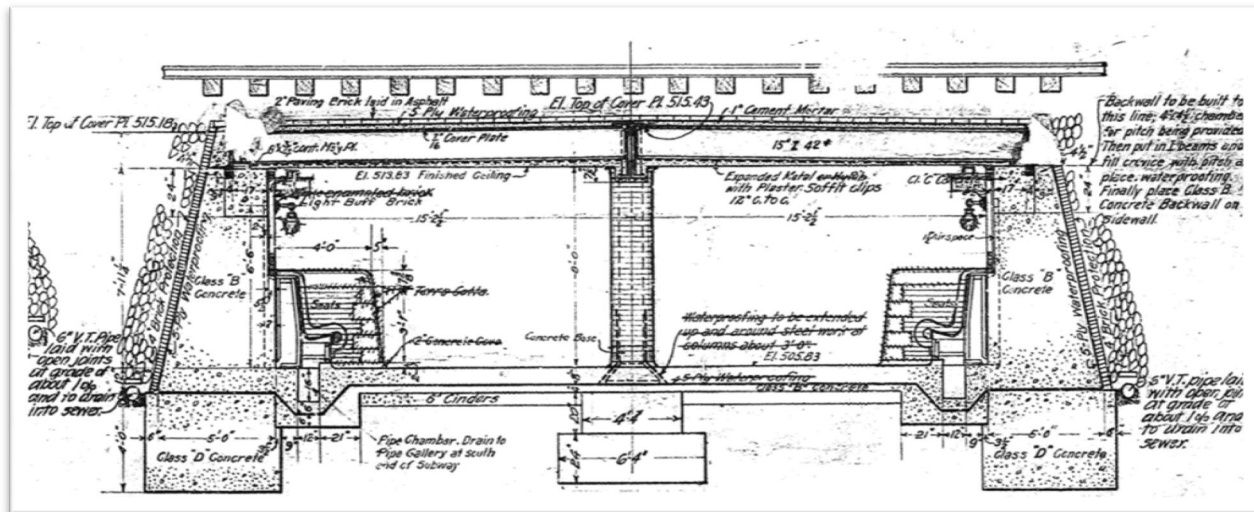


Figure 3 - Transverse Section Through Pedestrian Subway Tunnel

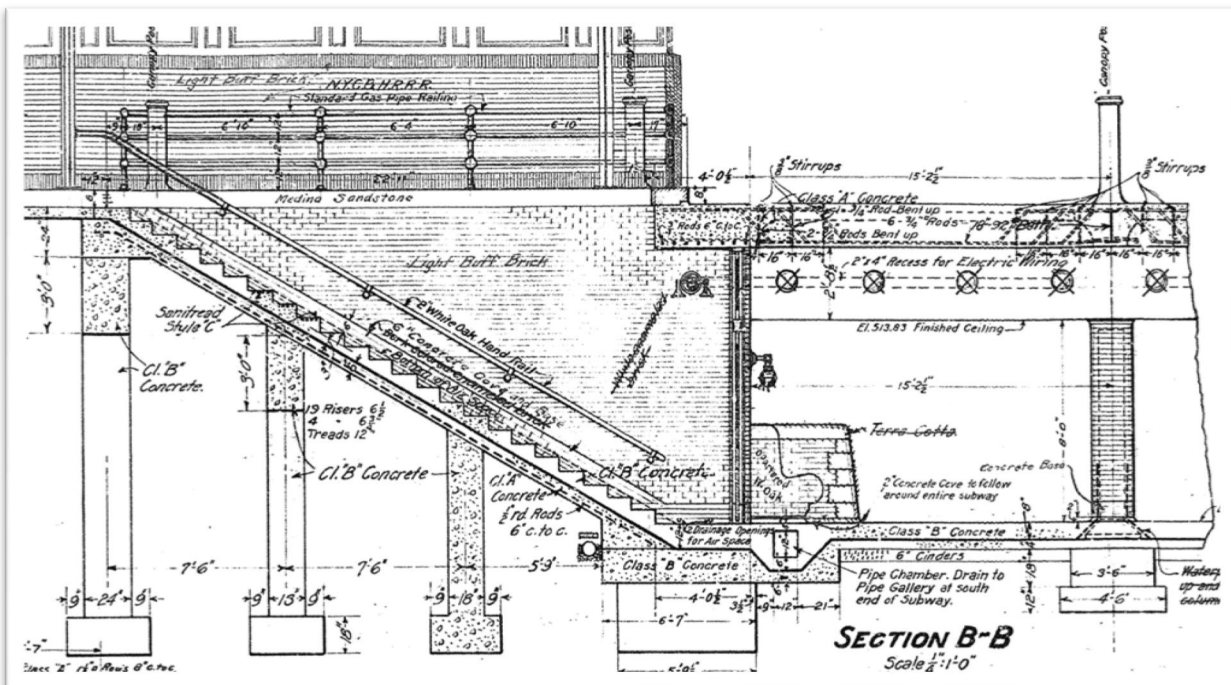


Figure 4 - Section Through Passenger Tunnel Stairwell to Track Platform



The baggage subway tunnel is located parallel to and east of the passenger subway tunnel. This tunnel was used for mail and baggage between the station and three platforms serving westbound trains. Elevators were used between the tunnel and track platform. The three eastbound platforms were reached at grade across the tracks. The baggage subway is 20 ft. wide and 9 ft. high. The foundations, walls and floor are reinforced concrete. The roof structure of the baggage subway tunnel is comprised of +/- 36" built up girders on 11'-3" centers spanning between the tunnel walls. These girders support 12"-31.5#/ft I-beams on 14" centers. The roof system is comprised of 7/16" steel plate placed over the I-beams topped with 1" of mortar, a waterproof membrane and 2" thick paving brick laid in asphalt. A smaller 7'6" x 6' utility tunnel exists below the floor of the baggage tunnel. This tunnel carried power and pipes from the power house located in the north side of the tracks to the station building.

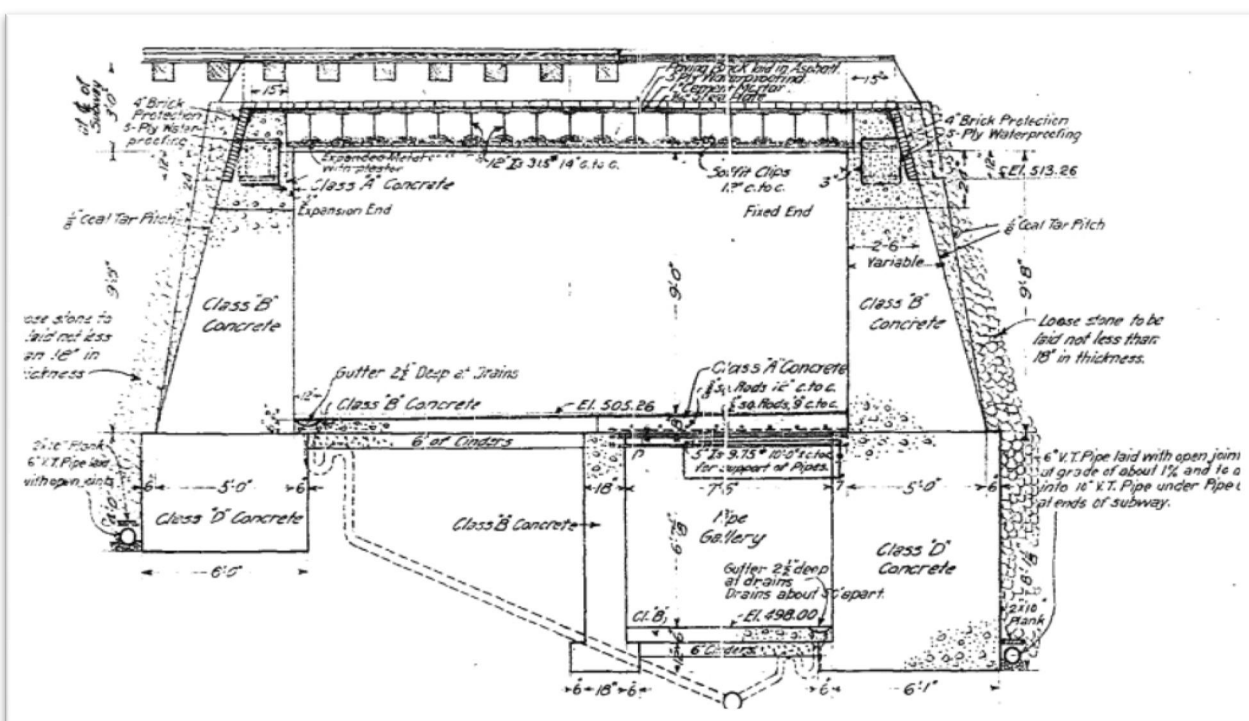


Figure 5 - Baggage Tunnel Transverse Section

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### **III. INSPECTION PROCEDURE AND INSPECTION ACCESS**

The intent of the inspection of the passenger and baggage subway tunnels is to perform a hazardous waste/contaminated material site assessment, perform an asbestos screening and to perform a visual condition inspection of the tunnels to determine their structural integrity.

Prior to inspection, a CSX Right of Entry permit was required to gain access to areas within CSX ROW. In accordance with CSX policy, flagmen were scheduled during all work on CSX ROW. All field personnel were required to have current CSX track safety training.

On December 13<sup>th</sup>, 2011, engineers from Parsons Brinkerhoff and Watts Engineering and Architecture evaluated the outside condition of the tunnels entrances. The original Station building for which the tunnels served is no longer in existence and the primary connection to the tunnels at their south end is now blocked and filled under the current Amtrak building. The field investigation at track level also revealed that all elevator shafts which once served the baggage subway tunnel have been filled and capped with concrete (See Figure 6). The only point of entry into the baggage subway tunnel is through a manhole located within the Amtrak parking lot. All but one of the ten passenger subway stairwells once used to access the platforms were filled and capped with concrete (See Figure 7). The conditions at these access points indicate the intentional placement of fill materials apparently in an attempt to prevent access. One passenger subway stairwell is only partially filled with a metal grate covering the opening. The metal grate has a section that is hinged and able to be opened. Access required sliding down the sloped soil pile to reach the tunnel section (See Figure 8). Entrance to the tunnels did not occur on this date due to CSX staffing issues and the potential health and safety concerns regarding the condition of these tunnels.



**Figure 6 - Baggage Subway Tunnel Elevator Entrance Looking East**



**Figure 7 - Passenger Subway Tunnel Stairwell Entrance Looking East  
(Condition Typical)**





**Figure 8 - Passenger Subway Tunnel - Partially Filled Stairwell with Grating  
Looking West**

Based on their current configuration and condition, the baggage and passenger subway tunnels were classified as “confined space.” Some of the general parameters of confined space are:

- The space is large enough and configured such that a person can bodily enter;
- The space has a limited means of entry and exit (this means you must use your hands or contort your body to enter the space);
- The space is not designed for continuous occupancy;
- Contains or has the potential to contain a hazardous atmosphere; or
- Contains a material that may engulf someone;
- Has an internal configuration that may cause an entrant to be trapped or asphyxiated; or,
- Contains any other recognized serious safety or health hazard.

The greatest concern stemmed from a possible lack of oxygen, combined with limited to no ventilation, and the potential of a toxic atmosphere from any one of a number of local site conditions. Based on these parameters, the tunnels qualified as confined space.

As a result, it was necessary to delay the inspection of the accessible passenger subway tunnel until confined space certified crew and required equipment was available including self-contained breathing apparatus (SCBA's).

On March 14<sup>th</sup>, 2012 engineers from Parsons Brinkerhoff and Watts Engineering and Architecture evaluated the internal condition of the pedestrian and baggage subway tunnels. Entry instrumentation included SCBA's, lighting, a photoionization detector for reading of volatile vapors, four gas meter, and communication devices. Inspection required a two person entrant team plus one attendant all trained in confined space entrant and/or attendant training.

An initial safety inspection entry was performed at both tunnels to assess the atmospheric conditions and to evaluate any other hazardous conditions including presence and depth of standing water or presence of any visible obstructions. Initial entry testing and evaluation results indicated safe conditions at both tunnels and the tunnel investigative entries proceeded without requiring the use the SCBA gear.

#### **IV. SUMMARY OF INSPECTION FINDINGS**

##### **PASSENGER SUBWAY TUNNEL:**

The inside of the passenger subway tunnel appears to have been abandoned with loose building materials and debris scattered throughout (Appendix A: Photos 1-4). The majority of the ceiling plaster has separated from the metal supports and now covers most of the tunnel floor (Appendix A: Photos 5-8). The stairwells have been filled to prevent access, and the south end of the tunnel which once connected to the original Station building has been bulk headed with concrete blocks (Appendix A: Photos 9-12).

The concrete tunnel walls are generally in fair to good condition with minor deterioration found along the top supporting seat of the roof structure (Appendix A: Photos 13-16). All of the columns along the center of the tunnel that support the central girder are in good condition with no apparent evidence of structural distress due to heavy loading associated with the roof dead loads and railway traffic (Appendix A: Photos 17-20).

The roof structure of the passenger tunnel below the platforms is in fair condition with minor deterioration. Typical deterioration consists of 1.5" to 2" deep spalling with exposed reinforcing bars, minor shrinkage cracking with efflorescence staining, and some minor active leakage (Appendix A: Photos 21-24).

The roof system and supporting structure of the passenger tunnel below the tracks is generally in good condition with minor corrosion to the supporting steel. There is no apparent evidence of active leakage and much of the original steel coating system is in fair to good condition (Appendix A: Photos 25-28).

Two steel casings approximately 4 feet in diameter were located near the southeast end of the tunnel. They appear to be positioned beneath the Amtrak building and it is assumed that they support two of the building's interior columns (Appendix A: Photos 29-32).

A hazardous material screening was performed during the inspection. The results of the screening inspection are included in a separate report.

##### **BAGGAGE SUBWAY TUNNEL:**

The inside of the baggage subway tunnel has significantly less scattered debris on the floor than the passenger tunnel. There is no evidence of a previously existing ceiling system and the steel roof structure is fully exposed. All elevator shafts which once served the baggage subway tunnel have been filled, and the north and south ends of the tunnel have been bulk headed with concrete blocks (Appendix A: Photos 33-36).

The concrete tunnel walls are generally in fair condition with minor deterioration, including minor spalling below the top seat at isolated locations and surface erosion in localized areas. Active leakage from the roof system and backwall is apparent along its full length, most significant near the southeast end of the tunnel where the overburden

fill appears to be seeping in, running down the wall and 4" to 6" of silty soil has accumulated on the tunnel floor adjacent to the east wall (Appendix A: Photos 37-42).

The roof system of the baggage tunnel below the platforms is in fair condition with minor deterioration. Typical deterioration consists of minor spalling of the underside of the concrete roof slab with exposed reinforcing bars, minor shrinkage cracking with efflorescence staining, and some minor active leakage causing a damp surface. The supporting structural steel is generally in poor to fair condition with 100% paint system failure and moderate to heavy rust. Active corrosion is apparent with less than 15% section loss estimated throughout (Appendix A: Photos 43-46). The roof system and supporting structure of the baggage tunnel below the tracks is also generally in poor to fair condition with 100% paint system failure and moderate to heavy rust. The steel barrier plate of the roof system has moderate pitting corrosion scattered throughout causing leakage and efflorescence staining on the supporting structural steel. The efflorescence of the above mortar is evidence that the waterproof membrane of the roof system has deteriorated. Section loss to the supporting structural steel below the tracks is estimated at less than 20% throughout (Appendix A: Photos 47-50). The roof structure of the baggage subway tunnel shows no apparent evidence of fatigue or displacement due to heavy loading associated with the roof dead loads and railway traffic.

A hazardous material screening was performed during the inspection. The results of the screening inspection are included in a separate report.



## **V. CONCLUSIONS AND RECOMMENDATIONS**

The 1914 passenger and baggage subway tunnels beneath the operating CSX tracks north of the existing Rochester station building are now 98 years old. The construction details and age have led to water infiltration. Repair of the water infiltration could be a significant and costly undertaking since it would involve the temporary relocation of the overlying tracks, removal of ballast and overburden, and reconstruction and resealing of the tunnel roof system. In addition to repair of the tunnel roof system, various repairs to the structural members within the tunnels to repair cracks, spalls and deteriorated structural steel would also be required.

Geometry of the existing tunnels is also a consideration. The existing tunnel stairwells will not be adequate or in the correct location for the new high level platform locations. Consequently, there will be significant cost associated with the retrofit and removal of all existing stairwells and the need to add new stairwells and elevator shafts for access to the new high level platform areas. This will require extensive modification to the existing tunnel walls in turn requiring modifications to portion of the tunnel roof structure. In addition, the existing tunnels have a relatively low ceiling height when compared to modern facilities. The ceiling height measured from the concrete floor to the bottom of structural steel is only eight feet. This minimal clearance leaves no room within the ceiling for mechanicals and cannot be altered without complete reconstruction of the tunnel.

The current location of the tunnels does not align with the planned connection of the new station building concepts. The new station building concepts call for a connection to the high level platforms from a new station building further east of the existing tunnels.

In conclusion, reuse of the existing 1914 passenger and baggage subway tunnels for passenger access is not recommended. The current condition, water infiltration issues, required repairs, inadequate geometry, location of the tunnels and long term maintenance issues associated with these structures are primary reasons for this recommendation. Other cost effective solutions for passenger and baggage access between the new station building and the high level platforms should be investigated.

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# **APPENDIX A**

## **Photographs**

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**Photo 1 - Passenger Subway Tunnel North End Looking North**



**Photo 2 - Passenger Subway Tunnel East Half Looking North**





**Photo 3 - Passenger Subway Tunnel West Wall Looking North**



**Photo 4 - Passenger Subway Tunnel Floor (Condition Typical)**





**Photo 5 - Passenger Subway Tunnel East Half Looking South**



**Photo 6 - Passenger Subway Tunnel East Half Looking North**



**Photo 7 - Passenger Subway Tunnel West Half Looking North**



**Photo 8 - Passenger subway tunnel East Half Looking South**





**Photo 9 - Passenger Subway Tunnel East Stairwell Fill**



**Photo 10 - Passenger Subway Tunnel West Stairwell Fill**



**Photo 11 - Passenger Subway Tunnel West Side South End Bulkhead**



**Photo 12 - Passenger Subway Tunnel East Side South End Bulkhead**





**Photo 13 - Passenger Subway Tunnel East Wall Looking North**



**Photo 14 - Passenger Subway Tunnel East Wall Looking North**



**Photo 15 - Passenger Subway Tunnel East Wall Looking South**



**Photo 16 - Passenger Subway Tunnel West Wall Looking South**





**Photo 17 - Passenger Subway Tunnel North End Central Columns Looking North**



**Photo 18 - Passenger Subway Tunnel Central Columns Looking South**



**Photo 19 - Passenger Subway Tunnel Central Columns Looking South**



**Photo 20 - Passenger Subway Tunnel Central Columns Looking South**





**Photo 21 - Passenger Subway Tunnel North End Platform Roof Slab Looking East**



**Photo 22 - Passenger Subway Tunnel North End Platform Roof Slab Looking West**



**Photo 23 - Passenger Subway Tunnel Platform Roof Slab Looking West**



**Photo 24 - Passenger Subway Tunnel Platform Roof Slab Looking East**





**Photo 25 - Passenger Subway Tunnel South End Roof Structure Below Tracks**



**Photo 26 - Passenger Subway Tunnel North End Roof Structure Below Tracks**





**Photo 27 - Passenger Subway Tunnel Roof Structure Below Tracks**



**Photo 28 - Passenger Subway Tunnel Roof Structure Below Tracks (Condition Typical)**



**Photo 29 - Passenger Subway Tunnel East Half Looking South**



**Photo 30 - Passenger Subway Tunnel East Half Looking North**





**Photo 31 - Passenger Subway Tunnel Steel Casing At South End**



**Photo 32 - Passenger Subway Tunnel Steel Casing At South End**





**Photo 33 - Baggage Subway Tunnel Looking South**



**Photo 34 - Baggage Subway Tunnel Elevator Shaft Fill (Condition Typical)**





**Photo 35 – Baggage Subway Tunnel North End Bulkhead**



**Photo 36 - Baggage Subway Tunnel South End Bulkhead**



**Photo 37 - Baggage Subway Tunnel West Wall Near South End**



**Photo 38 - Baggage Subway Tunnel Interior East Wall**





**Photo 39 - Baggage Subway Tunnel Interior West Wall**



**Photo 40 - Baggage Subway Tunnel East Wall Near South End**





**Photo 41 - Baggage Subway Tunnel West Wall Near South End**



**Photo 42 - Baggage Subway Tunnel East Wall Near South End  
(Above Fill Eroding Down Wall)**





**Photo 43 - Baggage Subway Tunnel Platform Roof Structure**



**Photo 44 - Baggage Subway Tunnel Platform Roof Structure**





**Photo 45 - Baggage Subway Tunnel Platform Roof Structure**



**Photo 46 - Baggage Subway Tunnel Platform Roof Structure**





**Photo 47 - Baggage Subway Tunnel Roof System Below Tracks**



**Photo 48 - Baggage Subway Tunnel Roof System Below Tracks**





**Photo 49 - Baggage Subway Tunnel Roof System Below Tracks**



**Photo 50 - Baggage Subway Tunnel Roof System Below Tracks**

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# **APPENDIX B**

## **Historical Article on New York Central Station at Rochester, N.Y. - 1914**



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